REMARKS

Claims 1-11, 13-26, 28-30, and 33-58 are pending. Claims 12, 27, 31, 32 are canceled and claims 1, 8, 11, 13, 17, 20, 21, 26, 28, 33, 37, 42, 43, 44 and 53 are amended with this response. Reconsideration of the application in light of the above amendments and the following remarks is respectfully requested.

I. REJECTION OF CLAIMS 1-58 UNDER 35 U.S.C. § 103(a)

Claims 1-58 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,919,957 (Nikoonahad). Withdrawal of the rejection is respectfully requested for at least the following reasons:

Independent claims 1, 21, and 53 are directed to an ion implantation system suitable for use in implanting ions into one or more workpieces and for detecting (*e.g.*, particles, defects, features, and temperatures) on the workpieces comprising: an ion implanter for producing a beam of ions and directing the beam of ions downstream toward the one or more workpieces held within an end station, the end station comprising: a rotary scan transport for providing rotary motion to the workpieces (*e.g.*, wafer) and an ***encoder count*** of the radial scan position. The end station also comprises a linear scan transport for providing reciprocating linear motion to the workpieces and an ***encoder count*** of the linear scan position. The implantation system further comprises an *in-situ* monitoring system associated with the end station suitable for detecting particles on the one or more workpieces during ion implantation comprising: a light source for providing a fixed beam of illumination to a portion of one of the workpieces; ***two detectors symmetrically affixed on either side of the light source and both oriented toward the illuminated portion of the workpiece for capturing scattered light from opposite viewing angles of the illuminated portion of the workpiece***; and a processor. The processor is configured to analyze the intensity of the scattered light detected from the illuminated workpiece, and map the light detected to *a* ***unique position*** on a workpiece ***determined by the encoder counts associated with the rotary and linear transports***.

Thus the *in-situ* monitoring system of the present invention comprises a detector assembly ***having two detectors symmetrically affixed on either side of a light source***. The two detectors provide ***two viewing angles*** of the ***scattered light*** (non-specular light) ***from the same illuminated portion*** of the workpiece. The inventors of the present invention have found that his opposite viewing angle provides not only increased amplitude scattered light detection, but an important second view of, for example, the same particle or defect from a more observable perspective statistically. For example, if a flat surface of a particle or defect is slanted more toward the second detector than the first detector, the scattered light received from the second detector may be several orders of magnitude greater than that of the first detector. This principle is analogous to the concept that binocular vision is much better than monocular vision by more than a simple sum of the component parts.

Nikoonahad does not disclose such ***a pair of symmetrically mounted detectors aimed at a single illuminated spot on a workpiece***. Rather, Nikoonahad discloses using one detector (46) in Figs. 3 and 4, and further teaches using two detectors in Figs. 5-7 wherein a first detector (46) is used for receiving ***incident (specular, bright field) light*** and a second detector (46) for receiving ***scattered (dark field) light,*** whether provided by one or two light sources (44).

Nikoonahad also does not disclose that both detectors are ***oriented toward*** the same illumination portion, because Nikoonahads' two-detector system utilizes both specular and non-specular light detection. Thus Nikoonahad has no motivation to orient both detectors directly at an illuminated spot. Note that one detector of Nikoonahad is mounted at an angle off a normal axis of the light beam for non-specular light detection, while a second detector (when used) is mounted in-line with the beam for specular light detection (Figs. 5, 6, 7). By contrast, the system of the present invention detects scattered (non-specular) light with ***both detectors*** from opposite sides of the illuminated spot to gain the unique advantage provided by two viewing angles of a single illuminated region.

Nikoonahad also fails to teach using ***an encoder or encoder counts*** to map the location of a particle, defect, feature, or temperature region.

Therefore, for the above stated reasons, Nikoonahad fails to render obvious the invention of independent claims 1, 21, and 53.

In regard to depending claims 3, 4, 11, 24, 26, and 44, Nikoonahad also fails to teach the detection of temperature variations on the workpieces. Thermal hot-spots may be produced on a wafer for a number of reasons such as elevated implantation energy levels. Accordingly, the inventor of the present invention has also appreciated that ***the detection of temperature*** is beneficially facilitated particularly with the two-detector assembly of the present invention for insuring uniform implantation dosage and depths, crystalline orientations, for avoiding hot-spots, and to minimize Vt variations. For example, the filter used in each of the two detectors may be the same, or may be different to detect and identify or contrast two wavelengths of infrared light energy useful in a thermal analysis using the processor.

Without an appreciation for the detection and contrast analysis required for such efficient thermal analysis, Nikoonahad would have no motivation to construct the detector assembly for such bi-focal detection operation as is presented in the present invention. Thus, Nikoonahad fails to teach or suggest the invention of claims 3, 4, and 11, which depend from amended independent claim 1; claims 24 and 26, which depend from amended independent claim 21; and claim 44 which depends from amended independent claim 43, respectively.

With regard to claims 43-52, claims 43 and 44 have been amended such that claims 43-45 recite a method comprising steps that are implemented by an implantation system having structure highlighted above with respect to independent claims 1 and 21. Claims 44-52 depend from amended independent claim 43. Therefore, Nikoonahad fails to teach or suggest the invention of claims 43-52.

In regard to claims 8, 13, 28, and 33, Nikoonahad in view of Kramer also fail to teach the use of a ***laser beam trap or beam dump having two neutral density filters***

to attenuate the specular laser reflections. Rather, Kramer teaches a black coated interior of a chamber to minimize these reflections.

In regard to claims 13, and 33, Nikoonahad in view of Kramer also fail to teach the use of a ***laser beam trap having a mirror and two neutral density filters*** to extinguish specular reflection of light from the laser***, the trap located between the two detectors***. Kramer does not teach the use of an assembly containing a mirror or the use of two detectors, nor does Kramer or Nikoonahad teach locating the beam trap between two detectors as is taught in association with Figs. 3, 6-10, and 12. It is also noted that the very basic design of the Kramer beam trap (44) is generally best suited to non-monochromatic (wider spectrum) light sources and/or those having a lower energy density than that of laser light sources. Therefore, Nikoonahad and Kramer fail to teach or suggest the invention of claims 8, 13, 28, and 33.

Further, in regard to claims 17 and 37, Nikoonahad in combination with Imai do not teach a ***workpiece held at a non-zero angle relative to a plane of rotary motion to provide a wafer clamping force as the disk spins and a tilt implant angle of about 5 degrees*** within ***an implanter having an in-situ monitoring system having two detectors symmetrically affixed on either side of a light source***. By contrast, the in-situ monitoring system of the present invention utilizes the angle formed by the surface plane of the wafer to provide an offset path for laser beam to be reflected along laser specular reflection back toward the mirror into the beam dump. In addition, the angle formed between the wafer and the disk plane, is also used by the ion implanter ***to provide a wafer clamping force as the disk spins and a tilt implant angle of about 5 degrees***. Therefore Nikoonahad and Imai fail to render obvious the invention of claims 17 and 37.

Claims 12, 27, 31, 32 are canceled.

Claims 20, 42, and 50 are amended for clarity and depend on amended claims 1, 21, and 43, respectively, and thus such claims are also not obvious over the cited art.

Accordingly, withdrawal of the rejection is respectfully requested.

II. CONCLUSION

For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-1733, EATNP154US.

Respectfully submitted,
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CERTIFICATE OF MAILING (37 CFR 1.8a)

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Amendment, Assistant Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date: February 24, 2006

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